Fundamentals of Multicomponent Diffusion in Multiphase Alloys

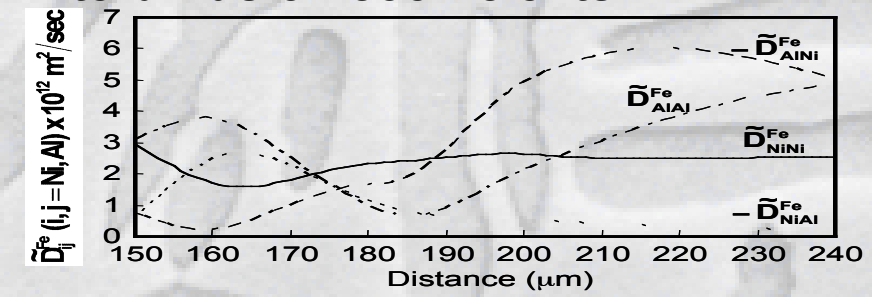
Yongho Sohn, University of Central Florida, DMR-0238356

Motivation:

Diffusion plays an important role in development and applications of materials that underpin many products and processes. This program aims to advance in phenomenological descriptions and experimental techniques for understanding multicomponent-multiphase diffusion through an integration of fundamental laboratory research and several education / outreach development.

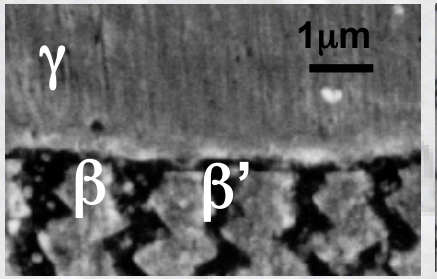
Phenomenological Development:

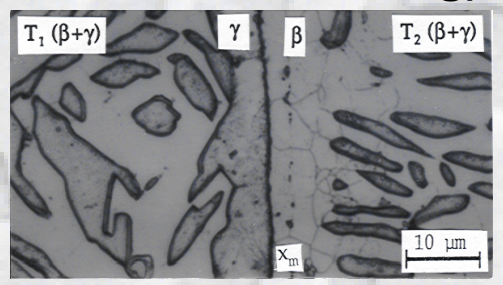
A new analytical technique to determine composition-dependent interdiffusion coefficients.



Microstructural Development:

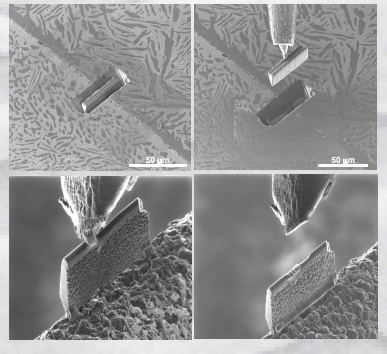
Novel observations of multiphase interdiffusion microstructures (e.g., three-phase equilibrium and demixing).

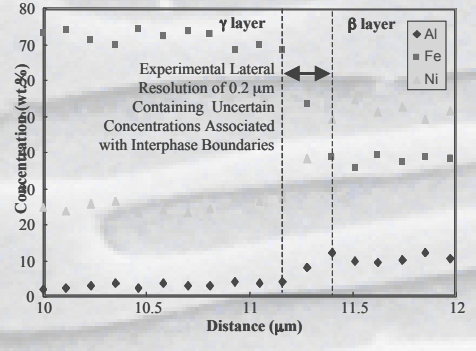




Advanced Experimental Technique:

Near interface composition determined (200nm in resolution) by transmission electron microscopy via focused ion beam in-situ lift-out.





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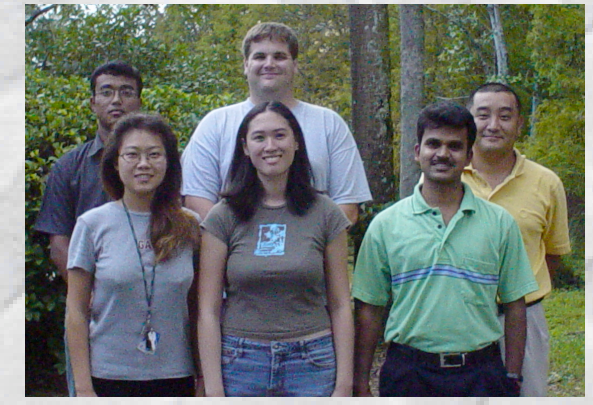
Education:

- Ms. Abby Elliot has received M.S. in materials with additional fellowship from UCF board of trustee.
- Student Support/Contributions:
  Mr. N. Garimella (Ph.D.)
  Miss J. Liu (Ph.D., Zonta Int. Amelia Earhart Fellow)
  Mr. R. Mohanty (Ph.D.)
  Mr. T. Patterson (B.S.)
  Miss C. Cruz (B.S.)



Broader Impact / Outreach:

- PI is personally working with Mr. Munar Bijani, a visually-impaired junior in Edgewater High School in Orlando, FL, to develop:
  - Training modules materials and diffusion with hands-on models.
  - Materials websites for visually impaired.
- On-going development of Materials Day for K-12 students in collaboration with ASM Central Florida Chapter and Orlando Science Center.